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Clinton Smiles on R&D In a Stringent Budget

With large chunks of the federal agenda slated for cuts, or at best steady spending, science and technology generally stood out among the favored few in the budget that the President sent to Congress last week for fiscal 1995, which begins October 1. The gains, however, were mainly of a smallish magnitude that would have provoked angered cries of neglect in old go-go days of zooming budgets. Not so in the new era of ironclad commitment to deficit reduction.

At this stage in a budget marathon that extends deep into summer, the specific numbers shouldn't be taken too seriously. Congress invariably boosts or reduces various items, while the White House applies mid-course changes. But the themes set by the President usually survive in the R&D category. And, as has been repeatedly declared by Clinton and his research advisors and managers, the pursuit of economic growth is the main driving principle in R&D spending. But Clinton also proposed an increase for defense R&D, thus reversing the decline in that category in recent years.

In the big picture, overall R&D spending would increase by nearly $2 billion above the sum appropriated for this year, to $73 billion. The civilian share would be 47 percent, unchanged from last year, when the civilian side gained 4 percentage points in its share of federal R&D spending.

The budget proposes a 2 percent increase in basic research for civilian agencies, while applied and developmental research would rise by 5 percent. Support for university-based research would rise by $437 million, to a total of $12 billion—thus losing ground to research inflation. The budget also decrees a one-year freeze in overhead on university grants as academe's share of the new federal frugality.

The R&D spending increases were unevenly shared among federal agencies. NASA remains the goliath on the civilian side, with an overall spending authority of $14.3 billion for next year, but that's a decline of some $250 million in the overstretched agency. Agriculture R&D held steady, which means an inflationary loss.

NSF was allotted a 6 percent increase, while NIH got 4.7 percent. Congress is always inclined to increase the medical-research budget, but tight budget caps limit the possibilities. In the Department of Energy, money previously bound for the Superconducting Super Collider has not been redeployed to other programs—and, as a result, the 1995 proposal for DOE basic research is down by some 35 percent.

The big winner in the Clinton budget is the National Institute of Standards and Technology, rapidly growing as a granting agency for industrial research. Under the Clinton budget, NIST's outlays would rise from the present $370 million to $527 million next year. The billion-dollar mark for NIST is not far off.

Big Pow-Wow Ponders Shifts in Research Policy

Whenever a husband and wife begin to discuss their marriage, they are giving evidence at a coroner's inquest.
H.L. Mencken

Science and government haven't sunk to that point. But in the best of times, they're a troubled couple, and now even more so without the binding forces of the Cold War. And so, they talked over their differences and hopes at an extraordinary national meeting hurriedly called for January 31 and February 1 by the Clinton Administration.

Held at the National Academy of Sciences under the title "Forum on Science in the National Interest: World Leadership in Basic Science, Mathematics, and Engineering," the meeting focused on an elusive topic: how to accelerate the production of riches from federally financed basic research

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In Brief

Daniel E. Koshland Jr. will step down as Editor of *Science* by the end of the year, according to word around the American Association for the Advancement of Science, publisher of the weekly journal. Exit arrangements are on the agenda of the AAAS Board at the Association's annual meeting, this week in San Francisco.

Teeming with profits from the soaring stock market, the Howard Hughes Medical Institute has announced the addition of 44 investigators to its nationwide roster, bringing the total to 275. The favored few, though remaining at their home institutions, go on the Hughes payroll, at salaries ranging from $51,000 to $276,000, depending on rank and bargaining power. Support is also provided for lab operations and staff, now totaling over 2000 across Hughes' worldspanning enterprises. Hughes says its endowment rose $780 million in 1993, to a total of $7.8 billion—the biggest bundle of all on the philanthropic landscape.

NIH Director Harold Varmus says he's signed up Howard Schachman, of UC Berkeley, as the first of several scientists who will roam around the scientific community to provide him with reports on what's going on out there. Referring to the job as an "ombudsman-type," Varmus said Schachman will perform at it for 120 days a year. Varmus expresses a strong distaste for traveling, though he goes back to UC San Francisco once a month pending transfer of his lab there to NIH.

Robert Galvin, former CEO of Motorola, has been appointed head of a task force to advise the Department of Energy on "alternative futures" for its research empire, described in a DOE press release as "the largest system of laboratories in the world." Reporting date: February 1995.

. . . Sen. Mikulski Demands More "Strategic Research"

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without maiming science in the process.

Behind it all were two factors: First, a desire by the White House to assure the basic-research community that it's loved, despite the Clinton Administration's preoccupation with industrial technology. Second, science's own concerns about Congressional intrusions into research policy. On this point, some of the chieftains of science naively feel that communication with Capitol Hill has somehow gone amiss, and that open discussion would be beneficial. The meeting brought pep talks and policy prescriptions from members of Congress who chair science-related committees—Senators Barbara Mikulski (D-Md.), Jay Rockefeller (D-W.Va.), and Tom Harkin (D-Iowa), and Rep. George Brown (D-Calif). And there was an address larded with fulsome praise of science by Vice President Gore. Though thin on substance, Gore evoked a thunderous standing ovation by repeatedly asserting the Administration's devotion to basic research.

Providing an insight into the genesis of the meeting, Gore declared, "There are those who have raised concern about this Administration's commitment to science, especially fundamental science. Some ask whether we really want an "S" in OSTP [White House Office of Science and Technology Policy]. Well, we do passionately," he said, as the audience clapped enthusiastically.

From scientists came promises to try harder. But also heard were expressions of exasperation by several participants who insisted that basic science is performing well and isn't responsible for the nation's industrial shortcomings or capable of curing them.

Among the 300 participants and observers in attendance, SGR encountered more than a smattering of belief that the meeting was just another dose of Clintonian public-relations syrup and that the ostensible goal of consultation with the scientific community was window dressing for programs already put into effect. One senior veteran of the Washington science-advisory circuit privately joked that he was certain that OSTP had completed its final report on the meeting prior to the opening session. But SGR got the impression that the majority appeared satisfied that Clinton and company are genuinely seeking guidance for developing a wholesome science policy in difficult economic circumstances.

The meeting itself produced nothing but hastily scribbled thoughts from nine panel discussions on priorities, science education, international collaboration and other such regulars on the science-policy agenda. The panel reports, the participants were told, are to be taken into consideration by Clinton's newly created National Science and Technology Council in formulating a national science policy as a complement to the President's previously stated technology policy.

The Mikulski factor was a big one in the decision to hold the meeting, since the Maryland Senator has thrust herself into science policymaking with unmatched vigor on Capitol Hill. She was unknown to the barons of science until the roulette of the Congressional seniority system worked its magic in 1989. That's when Mikulski, formerly a member of the House and before that a Baltimore social worker, became Chair of the Appropriations Subcommittee that rules over the National Science Foundation and NASA.

Last year, exercising the virtually absolute authority that goes with the appropriations chair, Mikulski directed NSF to put 60 percent of its research funds into "strategic research." Though lacking a standard definition, the term is generally accepted to mean research that produces tangible value. Defined that way, it lends itself to frightening depiction as the opposite of basic or "curiosity-driven" research. Failure to go strategic, the Senator warned, would cost NSF money, thus instantly gaining the attention of that otherwise slow-starting bureaucracy.

So, there on the agenda at the Forum on Science was Mikulski, a diminutive figure with a stevedore's voice, cheerfully wisecracking that the personal attentiveness accorded her by the scientific community might have something to do with the Subcommittee chair she holds. Then she got down to business, warning her audience of fascinated onlookers, "Unless we develop a new strategy that fits the realities of the new world order, science and science funding run the risk of being left out and left behind." To avoid this danger, she continued, science must get deeper into "strategic research."

"People ask," she said in her brassy style, " 'What do you mean by strategic research, and where did you get the so-called 60 percent solution?' By strategic research, I mean investments in science that are focused around important national goals." Among those she listed were climate change, biotechnology, and high-performance computing.

"It does not mean," Mikulski went on, "that every NSF or NIH grant must result in six patents or four commercial licensing agreements. Nor does it mean that every proposal must *guarantee* a private-sector payoff in a specific number of years. It does mean that we should be spending more than half of our basic research dollars in new areas we consider strategic."

Why 60 percent? The figure, she explained, "is based upon the Clinton Administration's request for NSF for

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Gibbons Ties Science Support to Economic Role

From the keynote address to the Forum on Science in the National Interest, by John Gibbons, the President's Assistant for Science and Technology.

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It is our intent to use this forum in the development of a national strategy for science that parallels the technology initiative developed in 1993 by the Administration....

The forces that have shaped the federal government's policies toward science and technology are changing, and as a result, the science and technology enterprise is undergoing its most thorough examination since the end of World War II. Our concept of national defense, which was the main implicit underpinning for support of science, has been modified. A new vision is emerging of national security, broadly taken, and the role of science in achieving that security.

The Clinton Administration believes America's future depends on continued, long-term support of research and development....

But what constitutes science in the national interest in the post-Cold War era and how to maintain world leadership in basic science, mathematics, and engineering are questions that are engaging many of us in the scientific community....

A New Concept of Research Policy

Since Vannevar Bush's report [*Science, the Endless Frontier*, the blueprint for post-war federal support of research], we have generally accepted his concept of basic and applied research and a linear model with basic research leading to applied research, development, and eventually to commercialization. This has been the dominant paradigm for describing the relationship of basic science to technology for the last 50 years....

Science, the Endless Frontier posits that there is a "perverse law governing research" that "applied research invariably drives out pure." Implicit in this idea is that science can be classified as basic or applied, and that there is a presumed tension, rather than complementarity, between the two.

These concepts have shaped our science and technology policy. Here, however, is where we depart from Vannevar Bush's canon.

There are many examples for which the linear model is inappropriate. Louis Pasteur's enormous contributions to microbiology are an often-cited point.... We can also cite examples of technology enabling new breakthroughs in fundamental science. Take large-scale computational capabilities as an emerging example....

This synergy between science and technology requires coherent federal policies in both areas. Perhaps an integrated model that acknowledges the interactions among basic research, applied research, and technology would be more appropriate....

While we all value the creation of knowledge about all aspects of our universe as a worthwhile human endeavor, pushing back the barriers of ignorance, we also recognize that a substantially altered rationale for continued federal support of science and technology is emerging.

The new rational is predicated on the fundamental interdependence between science and technology, the growing dependence of modern economics on a vibrant science and technology system, and broad national objectives in such diverse areas as industrial performance, health care, and environmental protection....

Consensus for Research Leadership

Some degree of consensus emerges [from various recent reports on science policy by government and private groups]. All come to rest on the clear need for ongoing leadership in basic science.

All stress the need for harmonizing the considerable resources devoted to science education across the government. This will permit us to maintain leadership in basic science research as a key national investment, even while chopping away at the federal budget deficit.

We hope to build upon this occasion and move quickly toward an explicit, comprehensive, rationalization of the federal role in the support of science.

As we look toward the new century, a scant 71 months away, we are painfully aware that the funding for the scientific enterprise is anything but endless.

There is now probably greater skepticism, more misinformation, and in some cases, naivete, about the societal relevance, moral acceptability, and economic value of fundamental, pioneering research than at any time since the appearance of *Science, the Endless Frontier* in 1945. Some fear that we may be on the verge of shredding the tapestry of our nation's magnificent scientific enterprise.

Show Science's Link to Prosperity

The reality of our situation should, however, be seen in the context that the advent of the post-Cold War era permits a change in the nation's goals and a redirection of federal funding from defense to non-defense purposes.

It is now imperative that we clearly and concisely articulate the intimate relationship between the pursuit of fundamental science and the long-term health, intellectual capital, longevity, and prosperity of our nation. We must communicate this persuasively to the public and to our representatives in Congress.

Remember, this Administration has set world leadership in science, mathematics, and engineering as a goal....

Vannevar Bush provided us with an enduring set of values, but we must now go beyond the endless frontier and provide the context for science in the 21st century.

. . . Chairman Brown Scoffs at "Strategic Research"

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1994—which proposed that 55 percent of NSF's budget should be for research in 'strategic' areas. The Congress didn't pick which areas were strategic, NSF did. We simply asked them to increase their focus by 5 percent," she said. The Clinton usage that she referred to was in a budget statement that identified NSF's role in a bunch of big multi-agency projects inherited from the Bush Administration.

Proceeding with her exposition of the Mikulski science policy, the Senator assured the audience that "The implications of this change to a more strategically-driven approach does not mean the end of basic research. We must do more basic research in strategic areas," she said, adding: "Those doing this research must recognize there's a national purpose for their work. In short," she suggested, "we need to rekindle in the scientific community a new sense of patriotism."

Regardless of deficiencies in the lucidity of this message, the scientists in the Great Hall of the Academy liked Mikulski, who is an engaging speaker. They even applauded strongly when she deplored "a sense of entitlement" in the scientific community, warning that there's not enough money "for every project and every PhD."

The topic of strategic research got further muddied that day when a contrary view was offered by Rep. George Brown (D-Calif.), Chairman of the House Science, Space, and Technology Committee. Brown is Capitol Hill's foremost, and only, statesman of science policy, doting on a subject shunned by most members as obscure and politically profitless. The political reality of Brown, however, is that the Committee he chairs can neither appropriate nor withhold money. Accordingly, he may be interesting, but he's not powerful.

Mikulski had finished and left when Brown took the podium and denounced "strategic research" as a useless, trouble-making concept. Stating his hope that the words would disappear from public dialog, Brown declared, "This term is a misnomer that has engendered a great deal of confusion. It seems to me that 'strategic research' is a contrived combination of words to achieve politically correct science parlance. It has no real meaning," he advised his listeners.

"Rather," Brown continued, "we should have strategic goals for the nation and we should invest in research as part of a strategy to advance those goals. We have done this in the past, when we developed the world's most sophisticated weaponry.... But the term 'strategic research' suggests the micro-management of individual researchers that only inflames an already confused debate about 'investigator-initiated' research as opposed to applied research."

Apparently heated up by the attention given Mikulski's nomenclature, Brown declared, "There is no reality in the term 'strategic research,' " and "There is no place for such contrivance in either legislation or in report language, in either agency mission plans or contractor proposals."

Similar Show Under Reagan

Has there ever been anything before like the big Science Forum that the Clinton Administration sponsored at the National Academy of Sciences?

Not exactly, but the Clinton production resembled another hurriedly called gathering of the science tribes in September 1981, also at the Academy. This one, however, was convened by the science establishment in response to reports that the fledgling Reagan Administration intended to cut all domestic programs by 12 percent, science included. Hostility filled the air.

With some 75 chieftains from various branches of science in attendance, the most prominent guest was a brash non-academician, George A. Keyworth , recruited from Los Alamos on the recommendation of Edward Teller, newly installed as Reagan's Science Advisor, and not inclined to reverence for his elite hosts.

Keyworth responded to the budget complaints by advising the assemblage that rapid growth in science spending had fostered "continuing tolerance for mediocrity and less emphasis and dedication to excellence." He also reported signs of "panic, if not certainly paranoia" in scientists' telephone calls to his office. Pronouncing American science in good health, he said, "We are not working from a position of overall retardation."

A more conciliatory manner was presented by the science man from the Office of Management and Budget, Fred Khedouri, who said Reagan and his advisors "recognize the importance of science and technology."

In any case, Reagan turned out to be a big fan of science, initiating the Superconducting Super Collider, the Space Station, and plans for doubling the NSF budget over four years.

Nonetheless, the tilting over semantics was carried on by Senator Jay Rockefeller, Rep. Brown's counterpart in the Senate as Chairman of the Subcommittee on Science, Technology, and Space. Given broad political concerns about economic growth, Rockefeller said, NSF should indeed "focus more" on strategic research. But, he immediately explained, "my definition of 'strategic research' is basic research in strategic areas.... Universities are best at basic research and education, and we should build on those strengths. At the same time, however," Rockefeller continued, "Congress has an obligation to expect NSF to do more than simply label parts of its budget 'strategic.' We have to see evidence of thoughtful planning, credible budgeting, and rigorous evaluation of whether specific investments are producing real results over time."

Having endorsed strategic research, Rockefeller expressed hope that it "will not come at the cost of eliminating funding for the broad range of scientific and engineering disciplines."

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A Critical Review of Demands for New Science Policy

One of the most widely praised papers at the Forum on Science in the National Interest was "The Concept of Strategic Research," by John A. Armstrong, former IBM Vice President for Science and Technology. Following are excerpts.

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I am convinced that if we scientists are to help deflect those who want to aim all serious research effort at short-term payoffs, we need as part of the process to examine our own notions of "basic research." We need to ask whether the vocabulary we use in discussing research is so one-dimensional as to be ineffectual, if not counterproductive....

Those who advocate using the category "strategic research" are well aware of the reluctance of the scientific community to embrace this idea. We are also aware of the difficulties to be faced if one takes these categories (strategic and understanding-only-driven) seriously and tries to use them to shape debate and guide policy. But in my view, coming to terms with the concept of strategic research, and learning to use it wisely and not too well, are inescapable tasks for the scientific community, and for science policymakers....

So far as I can tell, the fears in the scientific community about strategic research are of two kinds: first, that widespread use of the categories of strategic research (including strategic basic research) will lead to disproportionate funding for such work, to the detriment of what I have been calling "understanding-only-driven" research. The second fear is that misunderstanding of the complex interplay between basic and applied research will lead, in the strategic areas, to the requirement that even the basic research be done according to agency-driven timetables and milestones.

We must fight this notion on the valid grounds that it doesn't work. And it doesn't work because it does not reflect the way in which Nature gives up her secrets....

A further reason for restraint in the redirection of research funds is that deficiencies in US industrial competitiveness have almost nothing to do with lack of speedy technology transfer from university or government labs. The lack of competitiveness stems from failures of investment, lack of attention to low-cost manufacturing ... and to many other factors ... outside the R&D sector....

Clearly, it is possible to pick out areas of basic research which are a good bet in achieving society's goals. But it does not follow that we know what areas of science are not relevant. We may be able to conclude that certain areas are very long shots indeed, but it is the height of arrogance and folly to make that decision about all, or even most, of the understanding-only-driven areas....

Therefore it is prudent national policy to support substantial efforts in many fields of science where the motivation comes totally from the excitement and internal logic of the field. These areas of science flourish primarily in our great universities....

Policy Forum *(Continued from Page 4)*

But a few minutes later into his speech, he said, "I agree with Senator Mikulski's message to the university community: if you want new money in this era, then show us how universities can be more helpful to the economy; otherwise, funding increases should go to other agencies."

Rockefeller next raised "the controversial question of giving industry a more formal voice in setting the federal science priorities and budgets," stating that "If helping industry is now a major objective of US science policy, then there's an argument for that 'customer'—industry—to have a say in how dollars are allocated and programs designed."

When a member of the audience noted that industrial management had "decimated its own research" and therefore was a dubious candidate for influencing federal research, Rockefeller replied that he had merely raised the idea and had not endorsed it.

The nine panel discussions, interspersed with plenary sessions, had the trappings of democratic participation, but with the assigned panelists ranging in number from a dozen to 44, and just a few hours to chew over the cosmic issues of science and government, the results were ragged.

The discussions, however, produced some fresh insights and sharp expressions. Some of these came at a session titled "Priority Setting for the Federal Investment in Fundamental Science and Engineering." Among those around the big table was D. Allan Bromley, Science Advisor in the Bush White House, who observed that science policy was undergoing a speedy transformation "from 40 years of 'bottom up' to 'top down,' with a small group making the decisions." Bromley added that the change is taking place "without anyone recognizing it."

Robert M. White, President of the National Academy of Engineering, argued that "the present state of science and engineering is by and large healthy. The system isn't broken," he said, "but it is under stress."

The co-Chair of the panel, Lucy Shapiro, head of the Department of Developmental Biology at Stanford Medical School, said the difficulties that spawned the meeting originated in poor communication between science and politics. "The things they want us to fix are not broken," she said.

Noting that scientific research is only a small part of industrial success, Harvey Brooks, Professor Emeritus at Harvard and for many years a senior government advisor, observed, "The scientific community is being held hostage for the rest of the system."

James McGaugh, Director of the Center for the Neurobiology of Learning and Memory, UC Irvine, questioned "the premise that science won the Cold War and can fix the economy."

Shapiro replied, "The fear is, if we don't say it, we won't get money."—DSG

Science Academy Urges Strict Integrity Standards

With some members of the scientific establishment seething over Robert C. Gallo's close escape from scientific misconduct charges, the National Academy of Sciences (NAS) has ventured near the fray with a carefully crafted statement saying science should do better than what's merely required by law and federal regulations.

"As members of the professional research community," the statement says, "we should strive to develop and uphold standards that are broader than those addressed by the governmental regulatory and legal framework for dealing with misconduct in science."

The renowned Gallo, a lab chief at the National Cancer Institute, claimed exoneration last year when the federal Office of Research Integrity (ORI) declined to contest his appeal against its findings of chicanery in the early days of AIDS research [SGR, February 1, 1994: "Saint or Scoundrel?: The Gallo Controversy Goes On"].

While conceding that it couldn't satisfy the evidentiary standards recently imposed on the misconduct process by the Appeals Board of the Department of Health and Human Services, ORI stuck to its findings against Gallo, and embellished them by proclaiming "the importance of clarity, accuracy, and honesty in science." Officially, however, Gallo was off the misconduct hook. A possibility of criminal prosecution ended when the Office of the US Attorney in Baltimore, citing a series of technicalities, declined to pursue the case.

The Academy statement, drafted with the personal participation of Bruce Alberts, President of the Academy, and Kenneth Shine, President of the Institute of Medicine (IOM), doesn't specifically mention Gallo. But the circumstances of his case are there between the lines. And, in explaining the genesis of the statement, a senior member of the Academy staff told SGR that the Gallo case "was in the air." He added that "Gallo said he was exonerated when others felt he got off by a technicality."

The statement says, "Recent decisions by the Department of Health and Human Services in specific cases have been interpreted by some scientists as limiting the activities that are defined as misconduct in science. These decisions must not be taken to mean that the scientific community can reduce its efforts on ethical issues."

Issued on February 2, the statement carried the approval of the Councils of the Academy and the IOM and the Executive Committee of the Council of the National Academy of Engineering (NAE). It was accompanied by a press release noting that "Public debate continues in the aftermath of recent HHS decisions regarding cases of alleged scientific misconduct." The press release adds that the Academy organizations "are issuing a statement that speaks to the heart of the matter: Those responsible for integrity in science must recommit themselves to preventing misconduct in science and dealing with it effectively when it does occur."

Noting that the Academy has issued several reports concerning the maintenance of scientific integrity, the NAS-IOM-NAE statement expresses "concern that many recommendations included in these reports have not been implemented." The statement warns that misconduct "threatens to weaken the high ethical standards that characterize the research enterprise," adding: "Improper conduct can also impede the progress of science itself and reduce society's confidence in science and scientists."

The statement asks the White House Office of Science and Technology Policy to orchestrate federal research agencies in development of "a common definition and standard of proof" for scientific misconduct.

To strengthen the safeguarding of scientific integrity, the statement announced, the Academy will hold a "major national convocation" this spring. It said the program will include discussions of "how various research institutions have been educating faculty, staff, and students on the practice and ethics of research." Also, "Model programs for dealing with allegations of misconduct will be reviewed, and constructive steps for government and scientific organizations will be explored."

Varmus on Crooks vs. Jerks

At a meeting with the DC Science Writers Association on February 9, Harold Varmus, Director of NIH, was asked about the Academy statement on misconduct and its relation to the Gallo case. After stressing the importance of scientific integrity, Varmus continued as follows:

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I don't agree that we should be considering deviations from normal behavior as objects of persecution or prosecution.... To me, scientific misconduct is really clear: it's fraud, it's plagiarism, falsification, fabrication. My personal viewpoint is that we might be safer in sending all this to the courts, and being clear that the distinction between jerks and crooks is a very important one. It's a distinction that Howard Schachman [UC, Berkeley] is very fond of making.... I don't want to take a jerk to court. I'll take a crook to court.

Q. Are you suggesting then that ORI [Office of Research Integrity] is superfluous and should be replaced by a US Attorney?

Varmus. I wouldn't suggest that at this stage. In fact, it's out of my jurisdiction [ORI is attached to the Department of Health and Human Services]. Clearly, because of the recent set of rulings and reversals, there is some loss of confidence in the community in the ORI. They have to sort things out a little bit. I think we're all acting in a reflex manner to those dramatic changes that occurred. But I think it is a time when we can say that behavioral patterns, *per se*, should not be subject to prosecution for misconduct.

In Print

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Researching Health Risks (GPO Stock No. 052-003-01360-6; 228 pp., $13), from the Congressional Office of Technology Assessment (OTA), says research on methods for assessing health risks are underfunded by federal agencies, which altogether spent about $600 million last year for studies in this area, according to OTA's tally. As a percentage of federal health-research spending, risk research is in decline, the report states, adding that the multi-agency federal effort is "neither well integrated nor well planned." The OTA report calls for more basic research and studies of risk-assessment methodologies, and "research to fill chemical-specific data gaps." The report was requested by two House Committees—Energy and Commerce and Science, Space, and Technology. Margaret McLaughlin of the OTA staff served as Project Director for the study until May 1992 and was succeeded by Dalton Paxman. (A 44-page summary of the report is available without charge from: Office of Technology Assessment, US Congress, Washington, DC 20510-8025; tel. 202/224-8996; the full report is available as indicated below.)

Also from OTA: ***Technologies Underlying Weapons of Mass Destruction*** (GPO Stock No. 052-003-01361-4; 263 pp., $15), a review of the potentials for the spread and control of nuclear, chemical, and biological weapons and related delivery systems. Gerald Epstein of the OTA staff was Project Director for the report, which is a companion to an OTA report published last fall: ***Proliferation of Weapons of Mass Destruction: Assessing the Risk*** (GPO Stock No. 052-003-01335-5; 123 pp., $7).

Order from: New Orders, Superintendent of Documents, PO Box 371954, Pittsburgh, Pa, 15250-7954; tel. 202/783-3238; fax 202/512-2250.

Science, Technology, and Congress: Organizational and Procedural Reform (93 pp., no charge), final report from the expired Carnegie Commission on Science, Technology, and Government, recommending a series of changes in Congressional handling of S&T, including: establishment of a continuing forum as a meeting ground for scientists and legislators, defragmentation of the committee structure for S&T legislation, and longer funding cycles. There's also a broadside against the R&D pork barrel. Former Congressman John Brademas, President Emeritus of NYU, chaired the committee that prepared the report.

Order from: Carnegie Commission on Science, Technology, and Government, 437 Madison Ave., New York, NY 10022; tel. 212/207-6335; fax 212/838-6019.

Beginning a Dialog on the Changing Environment for the Physical and Mathematical Sciences (55 pp., no charge; supply limited), report of a conference, sponsored last August by the National Academy of Sciences Commission on Physical Sciences, Mathematics, and Applications, in troubled recognition of hard times and changing values in the grant economy. The report contains commissioned papers by William Ascher, Duke University; Daniel Kleppner, MIT; Albert Narath, P.A. Fleury, and R.J. Eagan, Sandia; Dale Jamieson, University of Colorado, and Charles F. Kennel, UCLA. Lots of talk about public loss of faith in science, overproduction of PhDs, facing up to political demands for swifter economic returns, etc.

Order from: National Academy of Sciences, Board on Mathematics, Room 315, 2101 Constitution Ave. NW, attn. R. O'Brien, Washington, DC 20418; tel. 202/334-2421; fax 202/334-1597.

Setting Priorities and Measuring Results at the National Institute of Standards and Technology (38 pp., no charge), the ground rules for spending and evaluating the impact of all that money pouring into one of the Clinton Administration's most favored agencies for trying to stimulate high-tech industrial innovation.

Order from: NIST, Program Office, Administration A-1000, Gaithersburg, Md. 20899-0001; tel. 301/975-2608; fax 301/216-0529.

Student Loans: Millions Loaned Inappropriately to US Nationals at Foreign Medical Schools (GAO/HEHS-94-28; 60 pp., no charge), from the General Accounting Office (GAO), says that between 1986-91, the US Department of Education approved $118 million in loans to US students attending foreign medical schools "without assuring that the schools met US standards." The Department, the GAO reports, "relies almost exclusively on information submitted by the schools," and "has no record since 1983 of any foreign medical school that did not meet its standards."

Order from: USGAO, PO Box 6015, Gaithersburg, Md. 20884-6015; tel. 202/512-6000; fax 301/258-4066.

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In Print

Official reports and other publications of special interest to the research community

(Copies of publications listed here are available from the indicated sources—not from SGR)

Science Advice to the President (Stock #92-12S; 329 pp., $29.95, plus $4 for shipping), from a bevy of living and late elder statesmen of science at the Presidential advisory level, a creaky assemblage of reminiscences, hallucinations of grandeur, and assorted policy prescriptions. Published by the American Association for the Advancement of Science, the volume is described as "Second Edition, Enlarged," a reference to the bulk of its contents having first been published in 1980.

The enlargement consists mainly of a four-page tribute to the wisdom of President Clinton's science and technology policies by John Gibbons, Clinton's science and technology advisor, followed by a 41-page blow-by-blow by his counterpart in the Bush Administration, D. Allan Bromley, who reports his White House days in comprehensive detail, from his problems of acquiring suitable office space for his staff to his conviction that "history will be kind to the Bush Administration with respect to its environmental activities." The volume covers sci/tech matters in all Presidencies dating back to Harry Truman, whose Administration is discussed by the editor, William T. Golden, a key figure in the creation of post-war federal science policy.

Order from: AAAS Books, PO Box 521, Annapolis Junction, Md. 20701; tel. 1-800/222-7809 or 301/490-0056; fax 301/206-9789.

Physics Research 1994: A Guide for Reporters (104 pp., no charge), press releases from over 100 universities and research centers describing their research in physics. The collection was put together for science writers by the American Institute of Physics, but others will find it useful as a guide to research and press-release production at various institutions.

Order from: Public Information Division, American Institute of Physics, One Physics Ellipse, College Park, Md. 20740, attn. Karin; tel 301/209-3090; fax 301/209-0846.

Women Scientists and Engineers Employed in Industry: Why So Few? (130 pp., $29, plus $4 for shipping), from the National Academy of Sciences, a report based on a conference held in January 1993 to discuss the sparse presence of women in industrial science and engineering. Whereas women comprised 16 percent of the US scientific and engineering workforce in 1988, the report states, they held only 12.3 percent of industrial S&E jobs. The low job rate is mainly attributable to educational patterns, rapidly changing in recent years as more women receive S&E degrees, the report states. But additional factors are at work, it adds, noting that women scientists and engineers are heavily concentrated in the life, behavioral, and social sciences, "fields in which industry is a less likely source of employment than academe or government." And those employed in industry tend to have higher "exit rates" than comparable job holders in other sectors, suggesting that "women perceive the climate in industry as less than favorable for a scientific or technical career."

The conference was chaired by Esther Conwell, a Research Fellow at Xerox Corp., and was organized by the Academy's Committee on Women in Science and Engineering, chaired by Jewel Plummer Cobb, President Emerita, California State University, Fullerton.

Also from the Academy, via its health-policy branch, the Institute of Medicine (IOM): ***Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research*** (558 pp., $49.95, plus $4 for shipping), recommendations for developing a preventive-research program for mental illness, drawn up by a committee chaired by Robert J. Haggerty, Professor of Pediatrics Emeritus, University of Rochester School of Medicine Dentistry. The report, based on a study mandated by Congress, states, "Currently, there is little evidence from research that any specific mental disorder can be prevented."

But noting evidence of "certain risk factors," it adds that "it seems quite appropriate to initiate interventions designed to reduce these identified risk factors (and also to enhance known protective factors) with rigorous evaluations of outcomes." Among the risk factors mentioned: exposure to alcohol abuse, genetic dispositions, "being female," and "living in poverty." The report is accompanied by an order card for a free diskette containing background papers and other materials commissioned by the IOM Committee. Patricia J. Mrazek of the IOM staff served as Project Director for the study.

Another from the Academy: ***Managing Global Genetic Resources: Agricultural Crop Issues and Policies*** (449 pp., $49.95, plus $4 for shipping), recommendations for an expansion of research and preservation of native crop varieties to guard against genetic vulnerabilities arising from wider use of specially developed crop varieties.

The report, latest in a series from the NAS Board of Agriculture, was produced by the Committee on Managing Global Genetic Resources: Agricultural Imperatives, chaired by Peter Day, Director of the Center for Agricultural Molecular Biology, Rutgers University. At a press briefing on January 31, Day warned of poor management of germplasm collections, stating that "there is little future in amassing large collections that die in storage because there are no resources or provisions for regenerating or renewing and replenishing the accessions."

Michael Strauss of the Academy staff served as Project Director for the report, which includes a list of previous publications in the genetics series.

Order from: National Academy Press, 2101 Constitution Ave. NW, Lockbox 285, Washington, DC 20055; tel. 1-800/624-6242; in the Washington, DC, area: 202/334-3313.

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